

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

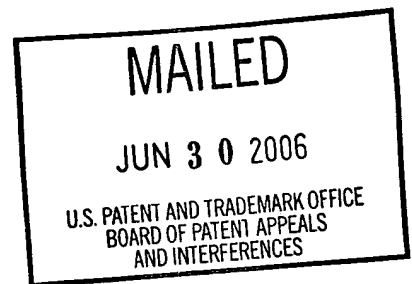
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

*Ex parte* HIDEKIYO TAKAOKA  
And KIYOTAKA MAEGAWA

Appeal No. 2006-1756  
Application 10/087,742

ON BRIEF



Before PAK, WARREN and KRATZ, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

*Decision on Appeal*

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner finally rejecting claims 1 through 6, all of the claims in the application.

Claims 1, 2 and 6 illustrate appellants' invention of a lead-free solder, and are representative of the claims on appeal:

1. A lead-free solder consisting essentially of:  
at least one selected from the group consisting of 0.01 to 1% by weight of Co, 0.01 to 0.2% by weight of Fe, 0.01 to 0.2% by weight of Mn, and 0.01 to 2% by weight of Pd;  
0.5 to 1% by weight of Cu; and  
90.5% by weight or more of Sn.
2. A soldered article comprising an article containing a transition metal conductor and being joined through a solder, said transition metal conductor being liable to spread in molten Sn, wherein said solder is a lead free solder according to claim 1.

6. A lead-free solder according to claim 1 containing only one member of said group.

The references relied on by the examiner are:

Carey, II et al. (Carey)	6,080,497	Jun. 27, 2000
Rikiya <sup>1</sup> (Japanese Patent Publication)	2000-190090	Jul. 11, 2000

The examiner has rejected appealed claims 1 through 6 under 35 U.S.C. § 103(a) as being unpatentable over Rikiya or Carey (answer, pages 3-6).

Appellants argue the claims generally and group claims 2 and 3 and claims 5 and 6 (brief, e.g., pages 4, 6 and 8). Thus, we decide this appeal based on appealed claims 1, 2 and 6 as representative of the ground of rejection and appellants' groupings of claims. 37 CFR § 41.37(c)(1)(vii) (2005).

We affirm.

Rather than reiterate the respective positions advanced by the examiner and appellants, we refer to the answer<sup>2</sup> and to the brief and reply brief for a complete exposition thereof.

#### *Opinion*

We have carefully reviewed the record on this appeal and based thereon find ourselves in agreement with the supported position advanced by the examiner that, *prima facie*, the claimed lead-free solder encompassed by appealed claims 1, 2 and 6 would have been obvious over the teachings of either Rikiya or Carey to one of ordinary skill in this art at the time the claimed invention was made. Accordingly, since a *prima facie* case of obviousness has been established by the examiner, we again evaluate all of the evidence of obviousness and nonobviousness based on the record as a whole, giving due consideration to the weight of appellants' arguments in the brief and reply brief. *See generally, In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

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<sup>1</sup> We refer in our opinion to the translation of Rikiya by the Japan Patent Office. The translation includes the caveat "has been translated by computer . . . [and] may not reflect the original precisely." Neither party argues the applicability of the translation in this respect.

<sup>2</sup> In response to our remand entered December 16, 2005, in Appeal No. 2006-0215 in this application, the examiner vacated the Office communication mailed October 17, 2005, in the Office communication mailed December 29, 2005.

We first consider the examiner's application of Rikiya. Appellants submit that the lead-free solder disclosed by the reference (*see, e.g.*, [0011] through [0014]) contains "bismuth and/or indium," that is, Bi and/or In, which provide certain characteristics to the solder, thus teaching "that Bi and In alter a basic characteristic of the solder" and are, therefore, excluded from claim 1 by the transition term "consisting essentially of," arguing that "[t]he issue is what the claims cover, and not what the specification discloses" (brief, pages 4-6; reply brief, pages 2-3). The examiner responds that appellants have the burden to establish that the introduction of Bi and/or In would materially alter the basic and novel characteristics of the claimed solder composition, and argues that the written description at pages 8-9 of the specification does not exclude these elements (answer, pages 4-5).

We find substantial evidence in the record supporting the examiner's position. The transitional term "consisting essentially of" appearing in appealed claims 1, 2 and 6 is used in claim construction to indicate that "the invention necessarily includes the listed ingredients and is open to unlisted ingredients that do not materially affect the basic and novel properties of the invention." *PPG Indus., Inc. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1354, 48 USPQ2d 1351, 1353-54 (Fed. Cir. 1998). Thus, the interpretation of this transitional term requires a determination of whether the inclusion of additional element(s) in the amount(s) taught in the applied prior art in the claimed compositions would materially affect the basic and novel characteristics thereof, because this phrase customarily excludes such materials. *See In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (explaining *Ex parte Davis*, 80 USPQ 448 (Pat. Off. Bd. App. 1948)). In arriving at this determination, the written description in appellants' specification must be considered. *Herz*, 537 F.2d at 551-52, 190 USPQ at 463 ("[I]t is necessary and proper to determine whether [the] specification reasonably supports a construction" that would exclude or include particular ingredients.); *see also PPG Indus.*, 156 F.3d at 1354-57, 48 USPQ2d at 1353-56 (Patentees "could have defined the scope of the phrase 'consisting essentially of' for purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention. The question for our decision is whether PPG did so.").

Our review of the written description in the specification reveals no teaching that Bi and/or In materially affect the basic and novel characteristics of the claimed solder composition, and indeed, appellants clearly state that

[a] low-melting metal such as Bi or In may be added as a solder component to the solder in order to lower a working temperature. In this case, the invented solder can exhibit the same advantages as above. [Specification, page 8, ll. 18-21.]

Thus, appellants have not carried their burden to establish that the written description in the specification evinces that Bi and/or In are deleterious to the basic and novel characteristics of the claimed composition of matter encompassed by the appealed claims, and thus, excluded from the claims by reasons of the transitional term “consisting essentially of.” *See PPG Indus.*, 156 F.3d at 1354, 48 USPQ2d at 1353-54; *Herz*, 537 F.2d at 551-52, 190 USPQ at 463.

Appellants further submit, with respect to claim 2, that Rikiya would not have taught using the solder disclosed therein “in connection with a transition metal conductor which is liable to spread in molten tin nor a solder” in which the transition metal is, among others, Cu (brief, page 6). The examiner responds that Rikiya would have disclosed that the lead-free solder disclosed therein can be applied to electronic equipment, and that it was well known that the transition metal Cu is used alone and in alloys as conductors in such equipment (answer, page 5). Appellants reply that there is no evidence supporting the examiner’s contention that the use of Cu in conductors was known, and that “to the extent that it may be true,” such a contention is “hindsight” as there is no evidence that “the conductor is liable to spread in molten tin” (reply brief, page 3).

We find substantial evidence in the record in support of the examiner’s position. That Cu alone and in an alloy is used as a conductor in electronic equipment is so well known as to defy dispute, and appellants have not established to the contrary. *See In re Ahlert*, 424 F.2d 1088, 1091-92, 165 USPQ 418, 420-21 (CCPA 1970) (notice may be taken “of facts beyond the record which, while not generally notorious, are capable of such instant and unquestionable demonstration as to defy dispute”). Thus, one of ordinary skill in this art would have reasonably applied a lead-free solder within the teachings of Rikiya, including a lead-free solder disclosed therein falling within claim 1, to the Cu conductor of any manner of electronic equipment,

notwithstanding whether that person would have recognized that Cu is liable to spread in molten Sn.

Appellants finally submit with respect to Rikiya that “there is no suggestion to pick only one member of the group” of elements specified in appealed claim 1 as required by claim 6 (brief, pages 8-9). We agree with the examiner’s position (answer, page 5), and particularly in view of the substantial evidence that Rikiya (e.g., [0011] and [0014]) would have taught that the lead-free solder disclosed therein containing Cu, Sn, and Bi and/or In, can further contain “one” of, among others, Pd and Fe, which is all that claim 6 requires.

We now consider Carey and appellants’ contentions that the tin alloys taught in cols. 27 through 30 of the reference contain one or more of a number of “elements, one of which is even lead,” that “[n]one of the specific tin alloys” falls within the claims, and that “preferred compositions (col. 30, lines 6-29) do not contain copper” (brief, page 7). On this basis, appellants submit that “[t]here are many millions of combinations that fall within” the teachings of the reference “before considering [*sic*] amount of each element,” and that the reference would have disclosed “tens of millions, if not hundreds of millions, of compositions outside of the scope of the claims,” arguing that “[t]here is clearly no motivation to manipulate the Carey disclosure to realize the claimed solder” or “guidance about which elements to select and which to ignore, or how to adjust concentrations” (*id.*, pages 7-8; reply brief, pages 3-4). Appellants thus submit that the disclosure of the reference “does not render a claim to a small number of compounds obvious,” relying on *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994), and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992) (brief, pages 7-8; reply brief, pages 3-4). The examiner responds that one of ordinary skill in this art would have been motivated to select the claimed elements in ranges of amounts from the disclosure of Carey in the reasonable expectation of arriving at a composition which achieves Carey’s objectives (answer, page 6).

We find substantial evidence in the record supporting the examiner’s position. We find that Carey would have disclosed to one of ordinary skill in this art general, typical and preferred formulations for Sn alloys which can be used as lead-free solders by listing elements in ranges of amounts which would provide alloys that have the characteristics taught by the reference (e.g.,

col. 5, ll. 12-26, col. 29, l. 53, to col. 30, l. 5, col. 30, ll. 47-63, and col. 32, ll. 11-22). Indeed, that the specified elements other than Sn can optionally be present is apparent from a range that has a lower end of zero (“0” and “0.0”). Thus, we find that Carey would have disclosed formulations of elements in ranges that can be used to formulate lead-free Sn alloys in which the number of optional elements is 6, 9, 13 and 21. Indeed, Carey would have taught that any arrangement of any number of the recited elements in an amount within the disclosed range can be combined with Sn for the intended purposes of a lead-free tin alloy solder, which elements include Cu, Fe and Mn.

Thus, one of ordinary skill in this art routinely following the teachings of lead-free Sn alloy solders in Carey would have arrived at lead-free solder compositions containing at least Cu as well as Fe and/or Mn in ranges of amounts that overlap or fall within the claimed ranges for these elements or that otherwise slightly differ from the claimed ranges. The latter slight difference would result in lead-free solders which one of ordinary skill in this art would have reasonably expected to have the same or similar properties to the claimed lead-free solders. Furthermore, appellants have not established on this record that the transitional term “consisting essentially of” excludes from the appealed claims any of the other elements listed in the general, typical and preferred formulations for as lead-free solders of Carey. Indeed, these formulations include Bi, which we discussed above, as well as Cr, Ag and Sb, and even Pb, that is, lead, which can be present in such small amounts as to be considered a contaminate, as provided in the specification (e.g., pages 2 and 8-9, particularly page 9, ll. 1-3).

On this basis, we determine that one of ordinary skill in this art would have reasonably arrived at the claimed compositions encompassed by claims 1, 2 and 6, including each and every limitation thereof arranged as required therein, without recourse to appellants’ disclosure. *See generally, In re Harris*, 409 F.3d 1339, 1341-43, 74 USPQ2d 1951, 1953-55 (Fed. Cir. 2005); *In re Peterson*, 3156 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir. 2003); *In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997) (citing *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974)); *Haynes Int’l, Inc. v. Jessop Steel Co.*, 8 F.3d 1573, 1576-77, 1577 n.3, 28 USPQ2d 1652, 1654-55, 1655 n.3 (Fed. Cir. 1993); *In re Woodruff*, 919 F.2d 1575, 1577-78, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990); *Titanium Metals Corp.*

*of America v. Banner*, 778 F.2d 775,783, 227 USPQ 773, 779 (Fed. Cir. 1985); *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); *see also Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807, 10 USPQ2d 1843, 1845-46 (Fed. Cir. 1989) (“That the ‘813 patent discloses a multitude of effective combinations does not render any particular formulation less obvious. This is especially true because the claimed composition is used for the identical purpose.”); *In re Susi*, 440 F.2d 442, 445, 169 USPQ 423, 425 (CCPA 1971) (“As appellant points out, Lauerer’s disclosure is huge, but it undeniably includes at least some of the compounds recited in appellant’s generic claims and is of a class of chemicals to be used for the same purpose as appellant’s additives.”); *In re Lemin*, 332 F.2d 839, 841, 141 USPQ 814, 815-16 (CCPA 1964)(“Generally speaking there is nothing unobvious in choosing ‘some’ among ‘many’ indiscriminately.”).

We are not convinced otherwise by the authority on which appellants rely as neither *Baird* nor *Jones* supports appellants’ position. Indeed, in each case, the reference provided no teachings which would have directed one of ordinary skill in the art to select particular moieties necessary to arrive at the therein claimed compounds. *Baird*, 16 F.3d at 382, 29 USPQ2d at 1553-55; *Jones*, 958 F.2d at 349-51, 21 USPQ2d 1941, 1943-44. In the present appeal, Carey would have provided direction to specific elements in specific amounts to arrive at lead-free Sn solders which are the same as or similar to the claimed solders.


Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in *Rikiya* and in *Carey* with appellants’ countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1 through 6 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The examiner’s decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (2005).

*AFFIRMED*

  
CHUNG K. PAK  
Administrative Patent Judge

  
CHARLES F. WARREN  
Administrative Patent Judge

  
PETER F. KRATZ  
Administrative Patent Judge

# BOARD OF PATENT APPEALS AND INTERFERENCES



Appeal No. 2006-1756  
Application 10/087,742

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